

**MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL
(MARSSIM) WORKGROUP MEETING NOTES**

MONDAY, MAY 17, 2004

ATTENDEES:

U.S. Environmental Protection Agency - OSWER/ERT-West: C. Petullo
U.S. Environmental Protection Agency - Headquarters: K. Snead
U.S. Environmental Protection Agency - Headquarters: L. Bender
U.S. Environmental Protection Agency - Region II: N. Azzam
U.S. Nuclear Regulatory Commission - RES: R. Meck
U.S. Nuclear Regulatory Commission - NMSS: J. DeCicco
U.S. Air Force: Major D. Caputo
U.S. Navy: S. Doremus
U.S. Department of Energy (DOE/EM): A. Williams
U.S. Department of Energy (DOE/EH): E. Boulos
U.S. Department of Homeland Security: C. Gogolak

MEMBERS OF THE PUBLIC:

Cabrera Services, Inc.: S. Hay (U.S. Air Force Contractor)

DISCUSSION

C. Petullo opened the meeting, and reminded members that they needed to provide the meeting host with special requests early (e.g., call-in requirements, copies). The Work Group (WG) reviewed the meeting agenda, and added a discussion of the glossary to the agenda for Wednesday.

The WG reviewed the action items from the March meeting. The Agency contacts for the advance notice of preliminary rule making (ANPRM) on RCRA C landfill disposal of radioactivity are DOE/G. Vasquez - (202)586-7629, NRC/P. Eng - (301)415-9349, and EPA/D. Schultheisz - (202)343-9349. K. Snead will invite D. Schultheisz to attend a future MARSSIM meeting.

The Agency representatives provided the number of hard copies of the MARSAME supplement needed for the intra-agency review. NRC will print 100 copies of the draft supplement and

distribute them to the Agency representatives as follows: EPA (K. Snead) - 35, NRC (R. Meck) - 30, DOE (E. Boulos) - 10, Air Force - 5, Navy (S. Doremus) - 5, Army (D. Alberth) - 5.

J. DeCicco provided a brief update on the NRC guidance development. The second review of the document, originally scheduled for June 2004, was postponed. January 2005 is the earliest date that NRC will provide a draft for public comment to the Commission. J. DeCicco will provide another update at the next MARSSIM meeting.

The Interagency Steering Committee on Radiation Standards (ISCORS) will not discuss the relationship between the MARSSIM WG and ISCORS until October. The MARSSIM chair (C. Petullo) will meet with A. Wallo and the Agency representatives to the MARSSIM WG to discuss and possibly resolve issues with the MARSSIM charter.

C. Gogolak reported that he is still reviewing information to determine if there is a relationship between scan coverage and the relative shift that can be used as a basis for survey designs in MARSAME. No relationship had been identified, but the research had not been completed.

TERMINOLOGY

The WG discussed terminology for the supplement. D. Caputo stated that the term “classification” was confusing to MARSSIM users because it is used to support two separate decisions; impacted vs. non-impacted, and the identification of an area as Class 1, 2, or 3. The suggestion was to use “categorization” to describe the impacted vs. non-impacted decision. The WG agreed to make this change and include a footnote in Chapter 1 describing this as a departure from MARSSIM terminology.

K. Snead requested that the definition of difficult-to-access use the term “readily-available instruments” instead of the term “hand-held instruments.” The WG agreed to this change.

S. Doremus suggested using the term “potentially difficult-to-access” early in the supplement to assist the users in understanding why difficult-to-access is an important concept and to identify potential problems as early in the process as possible. M&E identified as potentially difficult-to-access would require looking at alternative survey approaches and techniques to address the potential problem by 1) physically making the impacted areas accessible, 2) using process knowledge or modeling assumptions of alternative measurements techniques to make difficult-to-access areas accessible, or 3) disposal as radioactive waste where difficult-to-access areas are not generally an issue. The contractor was instructed to incorporate these ideas in the early chapters of the supplement.

The WG followed up with a discussion of accessible and measurable. The supplement should clearly differentiate between accessible and measurable. Measurability is the end product of the process to select a measurement technique. Accessibility is the ability to physically gain access

to an area. Measurability is the primary issue for MARSAME, and the dictionary definition of accessibility is one issue for determining whether or not radioactivity is measurable. The WG decided that measurability is the desired end point for the MARSAME supplement, and instructed the contractor to identify the inputs to measurability (including accessibility) and include them in the survey process development in Chapter 2 of the supplement.

An action level is a numerical value used to make a disposition decision. The glossary definition and discussion in Chapter 1 should include examples from EPA QA G-4.

Disposition is the act of determining acceptable future use, or to bring something to its conclusion.

ANALYTICAL RESOURCES

There was a meeting of the ASTM D19 committee in Las Vegas to discuss the development of a database of providers of analytical services. The primary purpose of the database is to support emergency response actions by maintaining a current list of resources for analyzing chemical, radiological, and biological samples. This database could also support analysis of samples for MARSAME and MARSSIM users.

There are three tiers of radiological service providers proposed for the database: simple (e.g., Gross Alpha, Gross Beta); medium (e.g., gamma spectrometry, drinking water analyses); and high (e.g., wet chemistry, high quality).

The Council on Ionizing Radiation for Measurements and Standards (CIRMS) is having a meeting October 25 to 27, 2004 at the National Institute of Standards and Technology in Gaithersburg, Maryland.

MARSAME COMMENTS DATABASE

The WG discussed the requirements for entering and reviewing comments in the MARSAME Comments Database for the Intra-Agency Review of the supplement. Each Agency representative would like to be able to assign passwords to individual reviewers, and download and review comments from reviewers within their agency. Only comments that have been approved by the Agency representative will be available for viewing by the rest of the WG.

The current database only allows the WG members to download all of the comments in the database at one time. C. Gogolak will check on the possibility of being able to download comments on individual documents (e.g., download all comments on Revision 5 of Chapter 3) and report back to the WG.

97 CHAPTER 3

98 The WG reviewed the editorial comments on Chapter 3 and determined appropriate responses to
99 comments.

100 ADJOURN

Meeting Date: May 18, 2004
Date Prepared: August 24, 2004

**MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL
(MARSSIM) WORKGROUP MEETING NOTES**

TUESDAY, MAY 18, 2004

ATTENDEES:

U.S. Environmental Protection Agency - OSWER/ERT-West: C. Petullo
U.S. Environmental Protection Agency - Headquarters: L. Bender
U.S. Environmental Protection Agency - Region II: N. Azzam
U.S. Nuclear Regulatory Commission - RES: R. Meck
U.S. Nuclear Regulatory Commission - NMSS: J. DeCicco
U.S. Air Force: Major D. Caputo
U.S. Navy: S. Doremus
U.S. Department of Energy (DOE/EM): A. Williams
U.S. Department of Energy (DOE/EH): E. Boulos
U.S. Department of Homeland Security: C. Gogolak

MEMBERS OF THE PUBLIC:

Cabrera Services, Inc.: S. Hay (U.S. Air Force Contractor)

CHAPTER 3 (continued)

The WG continued discussing comments on Chapter 3. Several comments discussed the use of the word “potential” in Chapter 3. The guidance in Chapter 3 should make it clear that a specific task is being accomplished in each section, and the titles of each section should identify the task.

Radionuclide contaminants of concern are finalized in Chapter 2. Section 3.2.2 should move to Chapter 2, and Chapter 2 needs to be revised and expanded to include scoping and characterization.

EPA, DOD, and NRC agreed that individual contaminants of concern need to provide at least 10% of the total dose or risk associated with whatever is being surveyed. A. Williams pointed out that DOE also factors in “perception of risk.” For example, even though uranium accounts for 95% of the risk associated with uranium enrichment plants, plutonium isotopes are included as contaminants of concern because of public perception. The guidance in Chapter 2 should not provide a specific value, but provide guidance for reducing the number of contaminants of

132 concern based on total dose, risk, or activity. Nuclides that contribute small amounts to the total
133 may not need to be considered individually as long as there is a relationship between the
134 radionuclides that can be used to account for that contribution.

135 Line 281 should include a statement that ratios are needed and a reference to MARSSIM. Ratios
136 will not be discussed in Chapter 2 since they are adequately discussed in MARSSIM.

137 Section 3.2.4 needs to provide guidance on when it is appropriate to use Section 3.4.2.1 and
138 when it is appropriate to use Section 3.4.2.2.

139 The WG had a detailed discussion on survey unit development. Survey units are linked to
140 segregation of M&E being surveyed. M&E can be segregated using physical (e.g., area,
141 volume) and radiological (e.g., activity, classification) characteristics. The WG listed several
142 reasons why segregation of M&E may be appropriate: issues with handling or size, recycle
143 options for different materials, and volume versus surface (measurement technique).
144 Segregation should not be driven solely by an action level.

145 Chapter 2 will be expanded to include a discussion of segregation. Chapter 3 will discuss survey
146 unit boundaries based on action level and measurement technique. Chapter 4 will identify actual
147 survey unit size and evaluation of survey unit size and boundaries when optimizing the survey
148 design.

149 Volume-based regulations need to consider potential concentrations of contaminants in reuse or
150 recycle scenarios. This idea needs to appear in Section 3.2.

151 ADJOURN

Meeting Date: May 19, 2004
Date Prepared: August 23, 2004

**MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL
(MARSSIM) WORKGROUP MEETING NOTES**

WEDNESDAY, MAY 19, 2004

ATTENDEES:

U.S. Environmental Protection Agency - OSWER/ERT-West: C. Petullo
U.S. Environmental Protection Agency - Headquarters: K. Snead
U.S. Environmental Protection Agency - Headquarters: L. Bender
U.S. Environmental Protection Agency - Region II: N. Azzam
U.S. Nuclear Regulatory Commission - RES: R. Meck
U.S. Nuclear Regulatory Commission - RES: G. Powers
U.S. Nuclear Regulatory Commission - NMSS: J. DeCicco
U.S. Air Force: Major C. Bias
U.S. Air Force: Major D. Caputo
U.S. Navy: S. Doremus
U.S. Department of Energy (DOE/EM): A. Williams
U.S. Department of Energy (DOE/EH): E. Boulos
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MEMBERS OF THE PUBLIC:

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DISCUSSION

Major C. Bias was introduced to the WG. D. Caputo is separating from the Air Force, and C. Bias will be replacing him as the Air Force representative to the MARSSIM WG.

CHAPTER 4

The contractor provided copies of Chapter 4 to the WG. The members took time to read the draft before providing comments.

The use of the terms median and mean were discussed. MARSSIM recommends using the mean as the appropriate measure of central tendency for environmental projects. The statistical tests in

MARSSIM evaluate the median and the elevated measurement comparison ensures the median and the mean are similar. Chapter 3, line 888, should make this distinction clear.

Section 4.1 needs to be expanded and include a smoother transition to the rest of the chapter.

Section 4.2 needs a new title so the user won't be intimidated by the statistical term "Hypothesis Testing." Specific guidance is required for release and interdiction surveys. The bullets on lines 69 to 73 need elaboration, especially in terms of 100% measurement surveys. These concepts may need to be brought to the beginning of this section. Graphics would be useful for describing the concepts in this section.

The action levels in Section 4.3 can be categorized as either the average (or total activity), not to exceed level, or an average with an elevated measurement criterion (or hot spot criterion). Each type of action level should be linked to a regulatory framework. D. Caputo suggested Reg Guide 1.86 as an example of an action level with hot spot criteria, and NUREG-1640 as an example of average or total activity. R. Meck questioned whether classification is necessary for MARSAME, since there is no obvious value added by classifying M&E. D. Caputo stated that classification has limited value in MARSAME. There are assumptions used to develop action levels. These assumptions are often policy decisions that are only available from the regulator. This idea should also be incorporated in Section 3.2.

Section 4.5 needs uniform structure and guidance provided for documentation. The MARSAME user should be instructed to follow regulations when they exist, but if there are no requirements MARSAME needs to provide guidance on how to address those situations. MARSAME needs to provide a list of technical attributes that need to be documented.

The material presented in this draft of Chapter 4 jumps from determining the number of measurements to selecting a survey design, and doesn't address developing a survey design. It is important to provide references to key points in earlier chapters. Additional discussion of uncertainty needs to be developed. Chapter 3 should include a description of measurement and spatial uncertainty and the relationship between the two.

K. Snead suggested that there may be more questions that need to be addressed than the two questions listed in lines 76 and 77 (i.e., what is the average and are there any areas of elevated activity). Suggested questions were:

What is the average activity in the survey unit?

What is the maximum activity in the survey unit?

What is the total activity in the survey unit?

Are there combinations (i.e., average plus hot spots plus total activity) that may be a problem?

How do we include the ideas of surface and volumetric activity in this list of questions?

The WG held a detailed discussion on Scenario A and Scenario B. Chapter 4 describes a different Scenario B than MARSSIM and NUREG-1505 (see Figure 1). In MARSSIM, the gray region is always less than the DCGL, but alpha and beta get switched between Scenario A and Scenario B. In MARSAME Scenario B has the gray region greater than the DCGL (or action level).

The WG also discussed the difference between the minimum detectable concentration (MDC) and the minimum quantifiable concentration (MQC). The MQC is related to how well the surveyor is able to quantify activity, and is applied to the average concentration. The MDC is used for detection, and is applied to the elevated measurement comparison. It is necessary to specify an area to determine the average activity for a survey unit or a hot spot. There is no demonstration of compliance with a “not to exceed” limit because the user won’t know what area or volume to measure.

Classification could be important if there is a way to link classification with the level of survey effort, which in MARSAME is the % scanned. Requiring classification without this link will produce guidance that no one will use. If a link cannot be established between classification and % scan, the guidance may become perform a 100% measurement or dispose of the M&E. There will be no need for classification and no need to consider accessibility issues. D. Caputo suggested assigning a fraction of the number of measurements required for a Class 1 survey to adjust the survey effort for Class 2 and Class 3 surveys. This fraction could be applied to scan coverage as well as total number of measurements. When multiple radionuclides are present the individual fractional ratios can be compiled to compute the total fraction to be measured.

If the scanned area is less than 100%, guidance is needed to describe the path that covers the locations needed to determine the average activity. You can’t use sigma divided by the square root of N to say the number of measurement results are sufficient (assuming the scan data are logged or recorded) because data points very close together are not independent. This means that 10,000 data points that cover 1% of the total surface area may not be statistically valid.

When small areas of elevated activity are a concern MARSSIM uses a systematic grid to control the maximum area. The WG discussed different approaches to address small areas of elevated activity in MARSAME. R. Meck described a box counter system where a mix of small items is counted. The M&E is counted, then mixed and counted again. The mixing is repeated until a statistically based goal on the average activity is obtained. The mixing provides a semblance of uniformity to the M&E being surveyed, but only the total activity is determined. C. Gogolak suggested laying out a grid on a flat surface and distributing the M&E in a uniformly thick layer. Measurements could be performed using a systematic or random pattern. G. Powers stated that the grid could also be projected onto the M&E if that was easier. The WG felt that each of these techniques were problematic.

In cases where the location of radioactivity is unknown or a combination of surficial and volumetric, the determination of whether to assume activity is surficial or volumetric should be made in Chapter 2. The determination is based on total activity, which requires the survey unit boundaries be defined. Calculate the total allowable surface activity by multiplying the action level for surface activity by the total surface area. Next, calculate the total allowable volumetric activity by multiplying the action level for volumetric activity by the total volume. Compare the total surface activity to the total volumetric activity. Whichever value is smaller represents the more conservative assumption. MARSAME will recommend that the more conservative assumption be applied when designing the survey.

There are two cases where less than 100% of M&E would be measured: 1) it can be done but the surveyor chooses not to, or 2) some areas are difficult to measure or access, so the surveyor chooses not to. The WG considered two questions: 1) is anything saved by reducing the % measured but increasing the handling of the M&E?, and 2) Is it cheaper or faster to measure less than 100%? There were no consensus decisions about this discussion.

The WG discussed the development of a technical justification for measuring less than 100% of M&E. C. Gogolak suggested that this type of decision would be based on professional judgment. If the regulator accepts the argument that the survey is defensible based on professional judgment, the survey is acceptable. MARSAME can't provide guidance on how to make the argument.

The WG considered segregation of M&E and how it could affect the survey design. If segregation is based on accessibility the disposition options could be limited. For example, disassembly of equipment to access interior surfaces could render the equipment unusable. In this case disposal and 100% measurement may be the only options. This idea needs to be added to Chapter 2.

The WG discussed the effect of segregation on the estimate of sigma, and how that might impact the survey design. It may be necessary to adjust the level of survey effort to account for M&E that can't be segregated. Mixtures of materials may require additional survey effort. For cases where sigma is very close to zero (e.g., homogeneous materials such as liquids) it may be possible to take very few samples, or even a single sample, as part of a technically defensible survey design.

GLOSSARY

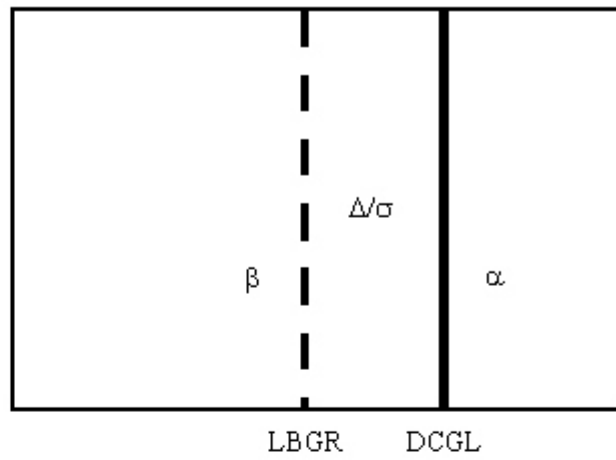
The WG identified several terms to be added to the glossary:

decision rule; disposition survey; discrimination level; and planning team.

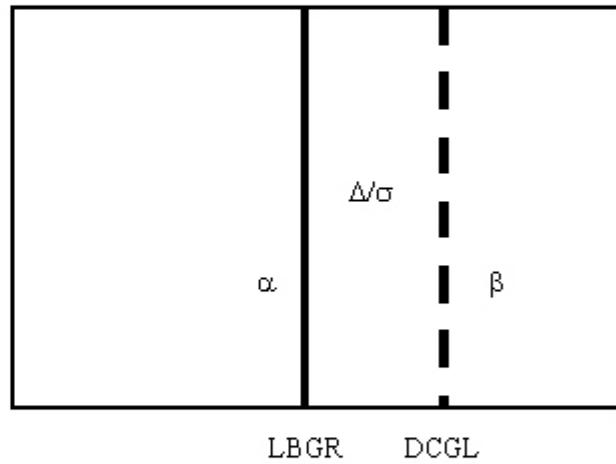
ADJOURN

Figure 1

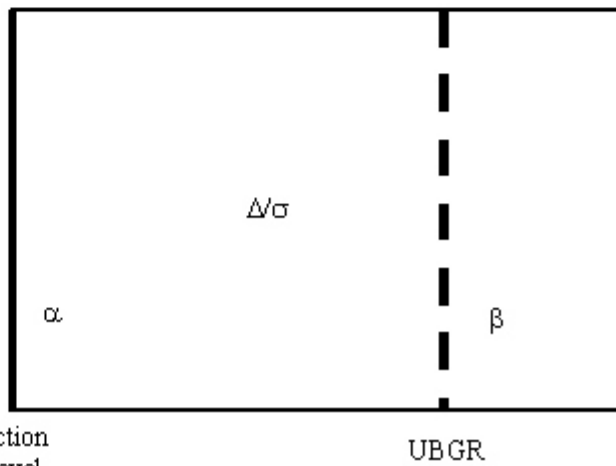
MARSSIM Scenario A
NUREG-1505 Scenario A
MARSAME Scenario A



MARSSIM Scenario B
NUREG-1505 Scenario B



MARSAME Scenario B
(Based on MARLAP)



Dark solid lines are values assigned by regulation. Dashed lines are values selected by site owners through negotiation with regulators.

Action
Level

UBGR

Meeting Date: May 20, 2004
Date Prepared: August 24, 2004

**MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL
(MARSSIM) WORKGROUP MEETING NOTES - DRAFT**

THURSDAY, MAY 20, 2004

ATTENDEES:

U.S. Environmental Protection Agency - OSWER/ERT-West: C. Petullo
U.S. Environmental Protection Agency - Headquarters: K. Snead
U.S. Environmental Protection Agency - Region II: N. Azzam
U.S. Nuclear Regulatory Commission: Dr. Bender (Escort)
U.S. Air Force: Major D. Caputo
U.S. Air Force: Major C. Bias
U.S. Navy: S. Doremus
U.S. Department of Energy (DOE/EM): A. Williams
U.S. Department of Energy (DOE/EH): E. Boulos
U.S. Department of Energy (DOE/EH): A. Wallo
U.S. Department of Homeland Security: C. Gogolak

MEMBERS OF THE PUBLIC:

Cabrera Services, Inc.: S. Hay (U.S. Air Force Contractor)
Cabrera Services, Inc.: N. Berliner (U.S. Air Force Contractor - by phone)

ISCORS

A. Wallo from DOE/EH met with the Agency representatives to discuss options concerning the MARSSIM WG relationship to the Interagency Steering Committee on Radiation Standards (ISCORS). A. Wallo is the DOE representative to ISCORS.

The major concern is that ISCORS was formed after MARSSIM. A. Wallo believes that it was the intent of ISCORS to absorb any multi-agency group dealing with issues associated to radiation. The MARLAP WG already reports to ISCORS, and he believes the MARSSIM WG should. The potential benefit is getting involvement of higher level managers earlier in the review process. Additional information on ISCORS and the individual subcommittees is available on the Internet at www.ISCORS.org. The relationship between ISCORS and MARSSIM does not impact DOE's participation in the production of MARSAME.

The MARSSIM WG members are tasked with determining whether or not they believe working as an ISCORS subcommittee will provide benefits to the WG without hindering the development process. WG members will contact their Agency representatives to ISCORS and provide their opinion. MARSSIM WG members are welcome to attend the ISCORS meeting. ISCORS will make their decision regarding the MARSSIM WG as a group, probably at their meeting in October 2004.

CASE STUDY EXAMPLES

E. Boulos provided an outline for the Case Study examples. The outline provided in the drafts is designed to follow the format of MARSAME. The revised outline uses a step-wise process related to MARSAME which is an outline for a roadmap, and provides references to appropriate sections of MARSAME. The WG discussed the relationship between the structure of MARSAME, the roadmap, and the Case Study examples. The consensus was that the structures should all be parallel. The case studies and the roadmap do not have complete drafts, so the WG decided to keep the structure of MARSAME as the basis for all the outlines until the drafts are further developed.

The WG discussed which examples should continue to be developed based on the contractor's estimate that each case study would be 50 to 60 pages long. The WG reduced the number of Case Studies to three, with three examples for each Case Study.

Decommissioning of a Mineral Processing Facility

- Release of crushed concrete

- Interdiction survey of rented front loader entering the site

- Release of front loader back to rental company

Nuclear Reactor Operations

- Release of air-monitoring equipment for maintenance

- Release of hand tools from controlled areas

- Release of small-bore piping

Nuclear Therapy PET Facility

- Release of trash from a medical facility

- Release of lightly activated waste

- Release of highly activated beam stop

The background information for the Case Studies needs to be expanded to provide enough information to support the subsequent decisions. C. Petullo requested that the historical information for the mineral processing facility be limited, similar to what might be available on a Superfund site.

Section 1.0 of the outline describes two separate decisions and should be divided into two sections. Section 1.0 should determine whether the M&E are impacted, which is covered in the

current Sections 1.1 through 1.5. Section 2.0 should focus on the selection of a disposition option., which includes the information from current Sections 1.6 to 1.8.

Some types of engine oil produce chemoluminescence and result in false positive readings using liquid scintillation counters. This idea needs to be included in Chapter 5 of MARSAME. A. Williams will research information on how tritium is monitored at power reactors and whether the monitors are calibrated onsite or at an offsite facility. A. Williams will also collect information on beam stops from accelerator facilities.

SCHEDULE

The WG developed a schedule for proceeding with development of the MARSAME. The next MARSSIM meeting was scheduled for either July 20 to 23, 2004, or August 3 to 8, 2004. K. Snead will check on the availability of a room at EPA. C. Petullo will contact R. Meck to see if a room is available at NRC.

The tentative agenda for the next meeting is:

Day 1 1 hour administrative and 7 hours review Chapter 3

Day 2 8 hours review Chapter 4

Day 3 8 hours review Chapters 5 and 6, Review Mineral Facility Concrete and PET Facility
Trash examples

Day 4 4 hours review direction and schedule

ADJOURN

ACTION ITEMS

371

372	All	Review relationship between ISCORS and MARSSIM and provide information to
373		Agency representatives to ISCORS.
374	C. Petullo	Check with R. Meck on the availability of a room for the next MARSSIM
375		meeting.
376	J. DeCicco	Provide update on NRC guidance development at the next MARSSIM meeting.
377	C. Gogolak	Determine if the MARSAME Comments Database can be modified to download
378		comments for individual documents instead of downloading all comments and
379		report back to the WG at the next MARSSIM meeting.
380	K. Snead	Invite D. Schultheisz to a future MARSSIM meeting.
381		Check on availability of a room for the next MARSSIM meeting.
382	S. Hay	Incorporate the concept of “potentially difficult-to-measure” into Chapters 1 and
383		2 of the supplement.
384		Global change accessible to measurable. Revise Chapter 2 to address identifying
385		measurability issues during the IA instead of considering difficult-to-access areas.
386		Provide information on quantifying expert opinion from social scientists (from
387		3/05 minutes).

PARKING LOT

388

389 Class 3 definition in MARSSIM may need adjustment to cover the “simple” case where the
390 relative shift is very large, which may become the definition of Class 3.

391 Develop an FAQ on classification to decide when an area is Class 2 and not Class 1 or Class 3.

392 Given a classification of Class 2 or Class 3, provide a % scan to release. Determine whether
393 scan coverage can be 0% in Class 3 areas.

394 Should MARSAME include prior knowledge (process knowledge) to design a disposition survey
395 using a Bayesian approach?

396 Develop a range of expected values for radionuclide relationships that may be used for surrogate
397 measurements.

398 Review the structure of Section 3.2.4.

399 Where are survey unit boundaries finalized, Chapter 3 or (new) Chapter 4?

400 Review structure of MARSAME and Case Study examples based on E. Boulos outline for Case
401 Study examples (5/04).